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Pesticide Fact Sheet Number 165: Isocyanurates

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Office of Pesticide Programs (TS-766C)
Washington, DC 20460

540FS 88-076

EPA

Pesticide Fact Sheet

Name of Chemical: Chlorinated Isocyanurates
Reason for Issuance: Registration Standard
Date Issued: March 8, 1988
Fact Sheet Number: 165

1. Description of Chemicals

a. Chemical Name: 1,3-Dichloro-s-triazine-2,4,6 (1H,3H,5H) trione.

Common Names: Dichloro-s-triazinetrione, dichloroisocyanuric acid.

Trade Name: ACL 70.

EPA/OPP Pesticide Chemical Code: 081401.

CAS Registry No: 2782-57-2.

Empirical Formula: $C_3HN_3O_3Cl_2$.

b. Chemical Name: 1,3-Dichloro-s-triazine-2,4,6 (1H,3H,5H) trione potassium salt.

Common Names: Potassium dichloro-s-triazinetrione; Potassium dichloroisocyanurate.

Trade Names: ACL 59; P.D.I.C.

EPA/OPP Pesticide Chemical Code: 081403.

CAS Registry No: 2244-21-5.

Empirical Formula: $C_3N_3O_3Cl_2K$.

c. Chemical Name: 1,3-Dichloro-s-triazine-2,4,6 (1H,3H,5H) trione sodium salt.

Common Names: Sodium dichloro-s-triazinetrione; Sodium dichloroisocyanurate.

Trade Names: ACL 60; CDB 60; CDB 63; S.D.I.C.

EPA/OPP Pesticide Chemical Code: 081404.

CAS Registry No: 2893-78-9.

Empirical Formula: $C_3N_3O_3Cl_2Na$.

d. Chemical Name: 1,3,5-trichloro-s-triazine-2,4,6 (1H,3H,5H) trione.

Common Names: Trichloro-s-triazinetrione; trichloroisocyanuric acid; trichloroisocyanurate.

Trade Names: ACL 90 Plus; CDB 90; T.I.C.A.; TCCA.

EPA/OPP Pesticide Chemical Code: 081405.

CAS Registry No: 87-90-1.

Empirical Formula: $C_3N_3O_3Cl_3$.

e. Chemical Name: [Mono-(1,3,5-trichloro)tetra (1-potassium 3,5-dichloro)] penta-s-triazinetrione.

Common Name: Penta-s-triazinetrione.

Trade Names: ACL 66; DS.

EPA/OPP Pesticide Chemical Code: 081406.

CAS Registry No: 30622-37-8.

Empirical Formula: $(C_3N_3O_3Cl_2K)_4.C_3N_3O_3CL_3$.

f. Chemical Name: 1,3-Dichloro-s-triazine-2,4,6 (1H,3H,5H) trione sodium salt dihydrate.

Common Names: Sodium dichoro-s-triazinetrione dihydrate; sodium dichloroisocyanurate dihydrate.

Trade Names: ACL 56; CDB Clearon; DICD.

EPA/OPP Pesticide Chemical Code: 081407.

CAS Registry No: 51580-86-0.

Empirical Formula: $C_3N_3O_3Cl_2N_2.2H_2O$.

g. For All Six Chemicals:

Year of Initial Registration: 1958

Pesticide Type: Disinfectant; sanitizer; algaecide; fungicide

Chemical Family: Halogenated triazines

U.S. and Foreign Producers: Olin Corporation; Monsanto Company; Fallek Chemical Corporation; ICI America, Inc.; ICD Chemicals, Inc.; Nissan Chemical Ind., Ltd.; Shikoku Chemicals Company; 3-V Chemical Corporation.

2. Use Patterns and Formulations

Application Sites: Major use is swimming pools. Minor uses include industrial water cooling systems; oil recovery systems; sewage systems; industrial preservatives; food processing/service industries; laundry sanitizer uses; household areas; mold and mildew; egg sanitizing and poultry drinking water sanitization.

Types of Formulations: Solids; aqueous dilutions.

Types and Methods of Application: Added as solids to swimming pools or industrial cooling water systems; aqueous solutions applied by mopping, scrubbing, flooding, sponging, spraying and immersing to food and non-food contact surfaces.

Application Rates: Sanitizer/disinfectant rates range from 47-4784 ppm available chlorine depending on the degree and circumstance of use, i.e., sanitizing, disinfecting, mold and mildew control; precleaned, non-precleaned, porous, non-porous, food contact surfaces. Swimming pools require a final residual level of 1-3 ppm; start up or super chlorination 21.3 ppm; periodic maintenance of 0.2-4.7 ppm. Industrial water cooling systems require an initial dose of 2-600 ppm and subsequence doses ranging from 0.5-107 ppm.

Usual Carriers: Water

3. Science Findings

There are no significant human toxicological or environmental fate data gaps for the chlorinated isocyanurates. Uncertainty exists in the areas of chronic effects to aquatic organisms.

Chemical Characteristics:

Color: White.

Physical State: Crystalline Solid.

Odor: Slight odor of chlorine.

Melting Point: 225-250° C.

Bulk Density: Powder, 0.50-0.65 g/ml; regular, 0.82-1.0 g/ml; granular, 0.85-0.96 g/ml; extra granular, 0.92-0.95 g/ml.

Solubility: Dichloro-s-triazinetrione, 0.8 g/100 g water at 25°C; potassium dichloro-s-triazinetrione, 9 g/100 g water at 25°C; sodium dichloro-striazinetrione, 24.8 g/100 g water at 26.8°C; trichloro-s-triazinetrione, 1.2 g/100 g water at 25°C; penta-s-triazinetrione, 2% in water at 30°C; sodium dichloro-s-triazinetrione dihydrate, 26.2 g/100 ml water at 25°C.

Vapor Pressure: Very small, impossible to measure.

Stability: Stable and relatively inert when dry.

Unusual Handling Characteristics: Strong oxidizing agents which should be kept away from heat and flames.

Toxicology Characteristics:

Acute Oral Toxicity: Toxicity category III or IV

Acute Inhalation Toxicity: Vaporization and respirable dust are not expected from the registered patterns of use.

Primary Eye Irritation: Toxicity category I

Primary Skin Irritation: Toxicity category III or IV

Problems which are known to have occurred with the use of the chlorinated isocyanurates, i.e., Pesticide Information Monitoring Service: None

Subchronic and Chronic Toxicity:

Isocyanurate related effects observed in the subchronic studies included hyperplasia of the urinary blader and calculi in male mice and hyperplasia of the lining of the urinary bladder in male rats. In the chronic study in rats, toxicity secondary to formation of calculi in the kidney and urinary bladder was observed in the male rats during the first 12 months of dosing at 5375 ppm. No effects were observed at 2400 ppm. No oncogenic effects were observed in the lifetime studies in mice and rats. The chlorinated isoyanurates do not induce reproductive effects in rats or teratogenic effects in rats or rabbits; they are not mutagenic. The chlorinated isocyanurates have low oral and dermal toxicity and high primary eye irritation toxicity.

Physiological and Biochemical Behavioral Characteristics: N/A

Environmental Characteristics:

Based on the available data, there are no apparant human exposure, groundwater, reentry, or drift issues associated with the registered patterns of use.

Ecological Characteristics:

The chlorinated isocyanurates are slightly toxic to birds, but are acutely toxic to fish and invertebrates. The chronic effects from these chemicals to aquatic organisms are not fully known, however.

Based on the registered patterns of use, no exposure to nontarget insect species or endangered species is expected.

Tolerance Assessment:

Uses of the chlorinated isocyanurates in food/feed handling establishments as sanitizing solutions on food processing equipment and utensils, and on other food contact articles are regulated by the Food and Drug Administration according to 21 CFR 178.1010(b)(2) and (c)(2).

The provisions of the Federal Food, Drug, and Cosmetic Act (Section 402) require the establishment of or an exemption from a tolerance for the use of chlorinated isocyanurate formulations as poultry drinking water sanitizers.

Agricultural uses of the chlorinated isocyanurates for the commercial treatment of eggs for human consumption are regulated under the United States Department of Agriculture (USDA) egg grading and egg products inspection programs. USDA requires that to be accepted under these programs, all formulations must be in compliance with 21 CFR 178.1010 as sanitizing solutions for food contact surfaces.

4. Summary of Regulatory Position and Rationale

The chlorinated isocyanurates are not being placed into Special Review. Available data indicate that the chlorinated isocyanurates do not pose a risk of serious acute injury to humans, avian species and aquatic organisms. Except for the mechanical damage resulting from calculi in the urinary bladder of male mice and rats dosed with saturated solutions of sodium isocyanurate in the drinking water, these chemicals produce no chronic toxicity effects.

The Agency has determined that the present precautionary statements for persons handling or applying the chlorinated isocyanurates are sufficient for the labels for manufacturing-use products. Currently registered manufacturing-use labels contain the signal word "Danger" and the associated precautionary labeling statements required for products with Category I acute eye irritation effects.

The Agency will not require nontarget insect studies because no honey bee exposure is expected from the registered patterns of use.

The Agency will not impose a special label advisory statement for endangered species at this time because the chlorine released from the chlorinated isocyanurates is so volatile there is little liklihood of exposure based on the registered patterns of use or from accidental spills.

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Because the Agency has data in its files which adequately demonstrates the efficacy of hypochlorous acid, no additional microbiological efficacy data will be required for manufacturing-use products which are to be reformulated into antimicrobials.

The Agency is requiring the establishment of or exemption from a tolerance for the use of chlorinated isocyanurate formulations as poultry drinking water sanitizers and as egg sanitizers.

While data gaps are being filled, currently registered manufacturing-use products containing chlorinated isocyanurate may be sold, distributed, formulated, and used, subject to the requirements of the chlorinated isocyanurate registration standard. The Agency does not normally cancel or withhold registration for previously registered use patterns simply because data are missing or inadequate. Data required under that standard will be reviewed and evaluated, after which the Agency will determine if additional regulatory changes are necessary.

Unique Warning Statements: None

5. Summary of Data Gaps

Wildlife and Aquatic Organisms:

Actual Field Testing - Aquatic Organisms: Due May 1990
Protocol: Due September 1988

6. Contact Person at EPA

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